

CA1  
FS 200  
-86 D21

Government  
Publications

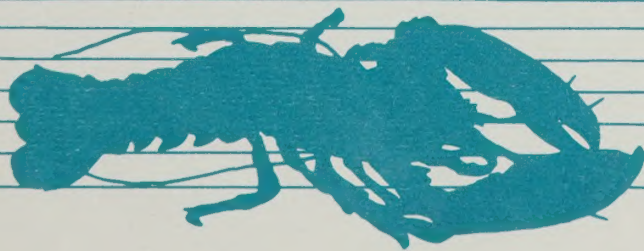
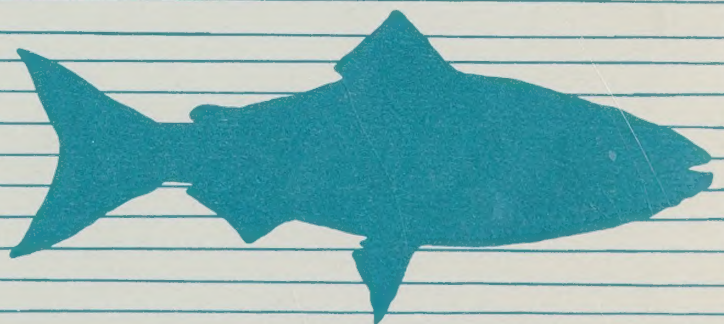
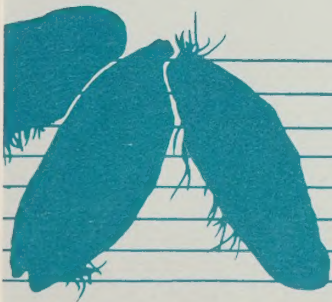
Government  
Publications

Fisheries  
and Oceans

Pêches  
et Océans

DEVELOPING  
AQUACULTURE  
CANADA

Discussion Paper











Fisheries  
and Oceans

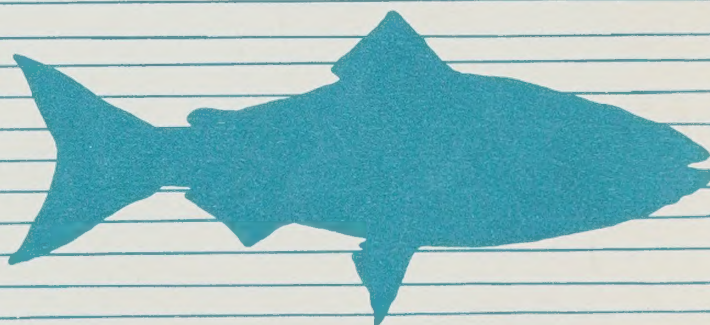
Pêches  
et Océans

CAI  
FS 200  
-86D 21

(2)

# DEVELOPING AQUACULTURE IN CANADA

A Discussion Paper



Canada





# PREFACE

911  
FS200  
-86D21

This discussion paper on Canadian aquaculture was prepared by the federal Department of Fisheries and Oceans (DFO) for review with Provincial Government officials as one of several agenda items at the following meetings:


<b>Sept. 18/85</b> <b>Regina</b>	Federal-Provincial Freshwater Fisheries Committee (comprising DFO, Alberta, Saskatchewan, Manitoba, Ontario and the Northwest Territories)
<b>Oct. 18/85</b> <b>Mont Ste. Marie</b>	Federal-Provincial Atlantic Fisheries Committee (comprising DFO, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador)
<b>Oct. 22/85</b> <b>Vancouver</b>	Federal-Provincial British Columbia Fisheries Committee (comprising DFO and British Columbia)

In those meetings, there was general agreement that DFO and the provinces should work closely to facilitate the development of the commercial aquaculture industry in Canada. Follow-up discussions have been ongoing to sort out the basis for that cooperation, as well as specific initiatives in each Province.

This document is now being released because of the growing public interest about the potential for the aquaculture industry in Canada. DFO is also releasing a statistical document entitled "*Private Sector Aquaculture Production and Value in Canada: An Overview*".

# TABLE OF CONTENTS

	Page
1. INTRODUCTION .....	5
2. CANADIAN INDUSTRY .....	6
3. RECENT REQUESTS OF THE DOMESTIC INDUSTRY .....	8
4. AGENDA FOR CANADIAN AQUACULTURE DEVELOPMENT .....	9
ANNEX I    FEDERAL ASSISTANCE .....	11
ANNEX II   THE LEGISLATIVE FRAMEWORK .....	13



Digitized by the Internet Archive  
in 2022 with funding from  
University of Toronto

<https://archive.org/details/31761115521411>



# DEVELOPING AQUACULTURE IN CANADA

## 1. INTRODUCTION

Aquaculture is defined as the cultivation and harvesting (farming) of finfish, shellfish and aquatic plants. In Canada, there has been commercial production of salmon, trout, tuna, oysters and mussels as well as the production of some species for pay-angling. Other species, including clams, abalone, lobsters, herring, sablefish, walleye and Irish moss are advancing through the pilot-scale stage.

Dwindling stocks of ocean fisheries, limitations on traditional fishing resources resulting from overfishing, the Law of the Sea, and the effects of pollution on natural habitats for fish and shellfish have spurred the growth of aquaculture production in many countries.

World aquaculture production increased rapidly from an estimated 6.1 million tonnes in 1975 to 9 million tonnes in 1981. Aquaculture production in 1981 was equivalent to about ten per cent of the global production of fishery products. It is estimated that Asia accounted for about 5 million tonnes of the 1981 world total. Leading aquaculture producers were Japan, 1 million tonnes accounting for 10 per cent of that country's edible seafood production, and China, over 2 million tonnes accounting for 25 per cent of its fish and seafood production.

Substantial growth of aquaculture production has also occurred in recent years in western Europe, particularly in Norway, Holland, France and Spain.

Aquaculture has become an increasingly significant component of production of edible fish and seafood in the United States, consisting of over 200,000 tonnes (in excess of 12 per cent of all fish and seafood production in 1983). Led by the farm production of catfish, U.S. aquaculture output increased by over 200 per cent between 1980 and 1983, while landings from the wild fisheries were virtually unchanged during the same period.

In comparison, the development of aquaculture in Canada has been more limited and slower. However, development is progressing in all regions — notably with: salmon, trout and oysters in British Columbia; trout in the Prairies, Ontario and Quebec; lobster in Quebec; and, salmon, mussels and oysters on the Atlantic coast. Canadian sales of commercially produced aquaculture finfish and shellfish are estimated to be more than 6,000 tonnes, compared with 1983 wild fisheries landings of 1.24 million tonnes.

The lower level of Canadian aquaculture development, relative to other countries, can be attributed to a number of factors such as environmental conditions and wild fisheries resources. Unlike certain countries (e.g. Holland, Spain and France), Canada has a large wild fishery which has, with some exceptions, been expanding during the past several years.

The wild fishery in Canada focuses on a very wide range of species and products (from low-priced to high-priced). Because of seasonal factors relating to wildfish reproduction and the Canadian climate — the wild fishery is, for many species, able to provide fresh fish and shellfish to the market only during certain months of the year and, as a consequence, it sells the preponderance of its output in other forms (e.g. frozen, salted, processed, canned). In contrast, commercial aquaculture in Canada focuses on a much narrower range of species, usually of a high-priced variety, and almost exclusively on the fresh food market. With controlled production techniques, Canadian aquaculture operations can turn out their product twelve months of the year and continuously deliver it in a fresh form to the market. The peak market period for aquaculture products, however, is at the time when fresh products are not readily available from the wild fishery.



In recent years, aquaculture has attracted much greater interest in Canada because of:

- the demonstrated success of aquaculture in many other countries;
- a strong and increasing market demand in Canada and export markets for an assured supply of quality fresh fish and seafoods;
- opportunities in Canada for the replacement of aquaculture imports (e.g. Norwegian salmon, Idaho trout);
- the employment and income which aquaculture generates, particularly in small coastal communities — as well as in a number of inland communities;
- the challenge of developing and applying the advances of science and technology to improve the quality of a basic resource and to create new economic opportunities;
- new developments in R & D, fish health and feed supply which have demonstrated the viability of the aquaculture of certain species (e.g. lobster);
- the growing interest in pay-angling aquaculture of freshwater fish near metropolitan centres;
- the recognition of the role for aquaculture in providing some stock for wild fisheries; and
- interest in the contribution that aquaculture can make to the support of the recreational and Native fisheries.

The experience to date with the farming of various species in other countries gives rise to a number of observations which are relevant to the Canadian situation:

- while warm-water aquaculture may be more prevalent, some forms of cold-water aquaculture can also thrive; the farming of salmon in Norway has been a major success; in the last four years, there has been a 400 per cent increase in output, resulting in total employment of 1,500-2,000;
- although the industry has grown rapidly world-wide, there also have been many failures (including Canadian ones);
- even the most successful developments have experienced a relatively lengthy period of slow growth; this was due to: environmental concerns; the frequent requirement for long term research into disease control, feed and broodstock development; difficulty of technology development and applications; and the time required to develop viable farms and supportive attitudes;
- the initiative for most commercial fish farms has come from the private sector; the success of these ventures has largely been dictated by their strength, organization, planning, and marketing; industry associations have been instrumental in giving small ventures more market strength;
- government support has often been very important; the key areas have been in the high-cost pre-production stage of research in genetics, disease control, feed development and facilities design; in some countries, government grants have sustained smaller operations for some period of time;
- many of the smaller or medium-sized farming operations which have been owner-operated and specialized are among the most successful ventures; and
- well organized, informed and disciplined approaches to marketing have been essential.

In the 1980s, aquaculture is one of the few areas of the food sector where there appears to be significant potential for new growth. The basic challenge will be for the aquaculture indus-

try and new investors to identify the most promising market opportunities and to exploit them.

## 2. THE CANADIAN INDUSTRY

### Brief Historical Overview

The priorities for development of the aquaculture industry in the 1980s must be built upon the successes to date and there is now much interest in the lessons to be learned from those who pioneered this industry in Canada. This covers a considerable time span. By the mid-1920s, the federal government had a wide network of hatcheries across Canada, including ones for salmon, trout, lobsters and shad. By 1930, many federal hatcheries were closed or transferred to the provincial governments that would take them. This led to many inconsistencies between regions in Canada.

Newfoundland has never had government hatcheries but a significant amount of salmon enhancement planning has taken place and commercial aquaculture is only now being initiated. A network of mostly federal salmon and trout hatcheries was established long ago in the Atlantic provinces and several of these hatcheries have since been upgraded. Quebec had a large network of leaseholds (e.g. private lakes) which gave rise to the need for private hatcheries in addition to several government facilities. Ontario also acquired and built up an extensive provincial hatchery network; similarly Manitoba, Saskatchewan and Alberta operated hatcheries for many years. The Province of British Columbia had hatcheries in support of inland fisheries and steelhead trout. Extensive development of salmon hatcheries in B.C. followed the introduction of the Salmonid Enhancement Program of the 1970s, a joint federal/provincial initiative.

In recent years, Nova Scotia and Quebec have enacted legislation to deal with aquaculture. Some other provinces are now considering new legislation in this area.

Since the beginning of the commercial aquaculture industry in Canada, aquaculture ventures have included: the production of rainbow trout in hatcheries, farms, and ponds; grow-out of Atlantic, coho, and chinook salmon in sea-pens; off-bottom rearing of oysters and mussels; depuration of clams; hatching and growing of abalone; impoundments of herring and sablefish; and on-shore rearing and holding of lobsters and Irish moss.

The trout aquaculture industry has had some considerable success and this can be attributed to both the advanced infrastructure and state of the skills and technologies. Most units now work closely with government agencies, and many have close ties to expertise in universities and laboratories. Reliable feed suppliers, disease certifications, together with established track records have reduced risks. The technology of freshwater trout culture is also less complex than that of saltwater salmon culture.

Several salmon farms in the coastal areas of Canada have experienced problems over time, particularly when they over-capitalized, striving for large vertically integrated operations, and used "off-the-shelf" expertise. Other major problems have related to financial planning and disease prevention. At the present time, however, this sector of the industry is attracting much new investment and the prospects for expansion are particularly bright.

Over time, there has been much effort on shellfish culturing. In Atlantic Canada, the focus has been on rehabilitating oyster beds and today there are some 2000 leases for oyster



culture. The oyster industry in the Atlantic region has had limited successes but a diversification and turnaround can now be noted. This has required technical support from both levels of government, in innovation and improvement of market opportunities.

Allied industries supplying foodstuffs, diagnostic services, vaccines, design services, etc. are growing, with many, such as the fish feed manufacturing industry striving to achieve economies of scale. Similarly, colleges and universities are developing new training and research programs. Governments continue to provide assistance to the industry, although the nature of the response varies greatly across the country. Annex I identifies federal programs which have provided some assistance to the industry.

There are about 1,000 licensed commercial aquaculture operations in Canada and about 4,000 private (hobby) fish culturists, located primarily in the prairie provinces. In 1984, commercial aquaculture production was estimated at over 6,000 tonnes with a value of approximately \$15 million. Trout farming is an established industry in several provinces, but much of the immediate growth in aquaculture production is expected to take place in coastal waters of the Atlantic and Pacific where the primary focus is expected to be on oyster, mussel and salmonid culture.

Resource-based recreation is the fastest growing demand on Canada's natural resources and a growing portion of recreational fishing in North America is being supported by the restocking programs associated with aquaculture. Hence the recreational fishing industry in Canada is also providing a stimulus to aquaculture development.

Native people, especially in B.C., have already expressed considerable interest in participating in the developing aquaculture industry in Canada. Their traditions and continuing dependence on hunting and fishing activities make many Native communities and individuals particularly well suited to participate in this new industry. Aquaculture has the potential to provide concrete opportunities for much needed job creation and incomes within Native communities.

### Market Potential

It is believed that between 80 and 90 per cent of Canada's current output of commercial aquaculture products is consumed domestically. About 10 per cent of the output is sold in the United States and these exports include: some trout (probably less than 100 tonnes per annum); small quantities of B.C. and Atlantic salmon; and about 10 per cent of our production of oysters.

At this stage in our aquaculture industry's development, it appears that the sales potential is centered on the domestic market and a few other markets (U.S. and Western Europe) which have been emerging as our customers. It also seems likely that the medium term growth will be concentrated on blue mussels, Atlantic and Pacific salmon, and Atlantic and Pacific oysters.

#### a) Medium Term

This section of the report deals with the medium term production and sales potential for Canadian aquaculture products. The views presented are essentially based on discussions with the trade since little is available in the form of "hard" data because:

- Canadian aquaculture production is dispersed over a wide geographic area and is fragmented among numbers of small producers. No single system of data collection is in place.

- For the most part, domestic export statistics do not treat aquaculture products as a separate item. Such products are included in the export data under "freshwater fish" or "other".
- Many aquacultured fish products are sold in very small quantities, as compared with wild fish species, so they are often not recorded separately in the trade statistics of importing countries.

Given the data limitations described above, plus the risk in trying to anticipate how the private sector will respond to market opportunities over the next five years, the following estimates of the sales potential are provided for discussion purposes on the understanding that they represent one view of the potential. The estimates deal with the major aquacultured commercial food fish and shellfish species which are presently being produced in Canada but exclude those species which are grown for purposes of wild stock enhancement and pay-angling.

### MEDIUM TERM SALES POTENTIAL

Major Species	Estimated 1984 Canadian Production (in tonnes)	Estimated 1990 Potential (in tonnes)
Blue Mussels	950	2,000*
Trout	1,800	2,500
Salmon - Atlantic	300	2,000
- Pacific	100	2,000
Oysters	2,800*	6,000*
Tuna	50	N.A.
<b>Total</b>	<b>6,000</b>	<b>14,500</b>

\* *Weight in shell*

With respect to blue mussels, it is expected that at least half of the sales in 1990 may be domestic. Some work has been done towards developing the U.S. market for Canadian cultured mussels and this export market could take 25-50 per cent of our production, in five years. Other large mussel-consuming markets, such as Holland, Belgium and France, also offer potential.

The trout industry is beset by relatively high production costs, a wide dispersion of producers, and some lack of organization with regard to marketing. There is also intense competition from Idaho imports. While some of these factors will tend to limit the growth of the market for frozen domestic trout, there appears to be some potential for increases in the volume of fresh product sales — although there will be strong competition in the fresh trout market from some foreign producers of good quality, low cost products.

Atlantic and B.C. cultured salmon could become a significant product in both domestic and export (primarily U.S.) markets. Provided that the many issues related to production and competing foreign products (mainly Norwegian and U.S.) are overcome, the U.S. market could consume 50 per cent or more of Canadian cultured salmon by 1990. Since the Canadian product will be competing with Norwegian and U.S. salmon, however, it will require effective marketing strategies in order for it to exploit these opportunities.

The current expectation is that recent advances in oyster culturing techniques on both the Atlantic and Pacific coasts will



result in more production stability than has been the case during the past decade. It is possible that our production could increase by about 50 per cent over the next few years. The U.S. market could take as much as 25 per cent of Canadian oyster production by 1990.

Assessment of the market prospects of cultivated European flat oyster have not been included in the estimates of sales potential. Currently, this species is being developed on a small scale in Nova Scotia and issues such as the availability of seed must be answered before this venture becomes viable on a large scale. Cultivation of this specialty product could become an interesting domestic and export market opportunity, provided larger volume production becomes viable. The market prospects for lobster have also not been cited because, although they are promising, the industry is now operating at a very low level.

#### **b) Long Term**

It is much more difficult to make reliable estimates of the longer term sales potential for Canadian aquaculture products for the following reasons:

- First, aquaculture development is typically long-term; usually features large numbers of small producers and is often characterized by slow growth in the initial period of development.
- Second, the aquaculture industry must frequently overcome numerous problems related to genetics, disease and mortality, and the development of efficient production technologies.
- Third, fish farmers must find a profitable niche in the market, usually in the face of competing wild and cultured products. While aquacultured species have the major advantage of year-round availability of fresh products, the Canadian output will encourage stiff competition from foreign aquaculture products (e.g. Norwegian salmon) which are already well established in terms of production viability and market acceptance.

Provided that the numerous technical, financial and marketing issues related to aquaculture development are successfully addressed, the longer term sales potential of the Canadian industry is promising. It is expected that the best potential for large scale volume increases in sales will be concentrated in Atlantic and Pacific salmon, oysters and mussels. Indications are that much of the growth over the next ten years will be based on sales in the Canadian and U.S. markets. Of all our export markets, the U.S. should offer the best sales potential for the Canadian aquaculture industry largely because of the U.S. market size, its proximity, lower transportation costs than European competitors and relatively easy market access.

### **3. RECENT REQUESTS OF THE DOMESTIC INDUSTRY**

Since the beginning of commercial aquaculture in Canada, spokesmen for the industry have articulated their requirements — many of these being directed to governments, universities and research institutions in the form of requests for project or program assistance. In the last few years, there has been an increased polarization in these industry views and they have been expressed more forcefully. The Report of the 1983 National Aquaculture Conference, the Science Council's 1984 Industry Task Force on Aquaculture and the Science Coun-

cil's March 1985 Statement on Aquaculture have contributed notably in this regard.

A general set of requests by the industry is described briefly below although no attempt is made to be exhaustive or to suggest their priorities.

#### **Recognition as an Industry**

Aquaculturists want to be recognized as members of a distinct and new industry. Public, private and government recognitions are required in this regard. The profile of the industry needs to be raised and sharpened. This would then help individual aquaculturists in obtaining assistance from private financial institutions.

#### **Clarified Government Roles**

The aquaculture industry has urged federal, provincial and municipal governments to "get their houses in order" for aquaculture. Several demands have been for governments:

- to assign a high priority to aquaculture;
- to name a "lead agency" for aquaculture in each government;
- to develop policies, plans and supportive programs;
- to encourage intragovernmental and intergovernmental coordination of efforts;
- to establish supportive legislation specifically for aquaculture and to eliminate duplication between various statutes and jurisdictions\*;
- to clarify and simplify the regulations governing all aspects of aquaculture.

#### **Mechanisms for Industry-Government Cooperation**

To bridge the "two solitudes", the industry has been pressing for some planning and coordination mechanisms which would enable governments (both federal and provincial) and industry to work together for the advancement of aquaculture in Canada. Perhaps the most detailed proposal in this regard was put forward by the Science Council's Industry Task Force on Aquaculture. In summary, that proposal called for industry-government committees in each province which would facilitate dialogue, joint planning, policy advice to governments and coordinated action.

#### **Data and Analysis**

As a relatively new industry in Canada, aquaculture has some very basic requirements for data and analysis.

**Statistical Database:** A regularly maintained, aquaculture database in Canada is virtually non-existent. Data on aquaculture are traditionally subsumed by and hidden in the overall database for the commercial fisheries. An annual report on data pertinent to the industry would be helpful.

**Market Analysis:** There is a need for an improved understanding of the supply and demand relationships for actual and potential aquaculture products. Regular monitoring of aquaculture markets and foreign competition would be useful — as would information on appropriate product forms, pricing, distribution channels and promotion.

**Biotechnical Feasibility:** There is insufficient information available on the economic viability of emerging technologies and culture methods. Advances in science and technology often need to be proven in the laboratory or in pilot

\* *Annex II provides a brief description of the federal and provincial jurisdictions.*



projects before industry will adopt them.

**Financial Analysis:** An increased knowledge base is required for the financial analysis of aquaculture ventures so as to determine the appropriate levels of investment for new ventures. Similarly, risk analysis studies may be needed to attract increased assistance from the banking and insurance communities.

**Information on Feedstuffs:** The success of aquaculturalists is highly dependent on access to the appropriate feed ingredients. Increased information on this subject would be helpful. For example, an inventory of those feedstuffs which are commercially available, together with an indication of cost and performance potential, would benefit the industry.

#### **Stock Supply**

While there are some fully integrated aquaculture firms, other operations rely on external sources for seed and foundation stock supply. Much of this reliance has been on government salmon hatcheries which were established to support the wild fisheries. More recently, some private corporations have begun to supplant this public sector service. Over the long term, this should clearly become a private sector responsibility. For the aquaculturalists, the key concerns are to obtain sufficient supply, disease-free, on a timely basis and at a reasonable price.

#### **Professional/Scientific Services**

Given the limited size, the geographic dispersion, and the nascent state of the industry — the delivery of professional and scientific services is also a major concern. These include disease diagnosis, expansion of present certification programs, and laboratory analysis of water, feed ingredients and pollutants. Although government laboratories have provided many of these services, an opportunity exists for increased private sector delivery. The commercial aquaculture industry also has a need for economic and business management services which can respond to that industry's specialized needs.

#### **Research and Development**

Additional development-oriented research is often requested in areas such as genetics, nutrition, fish health, physiology, biotechnology and food science. Similarly, the industry has called for increased participation by governments, universities and others in pilot scale projects and experimental farms. The need for technology transfer, both Canadian and foreign, is regularly emphasized.

#### **Financial Assistance**

Both the National Aquaculture Conference and the Science Council's Industry Task Force expressed some need for further financial assistance for the industry through an extension or enhancement of existing government programs (e.g. grants, tax incentives, loans, venture capital investments, promotion, marketing assistance). Improved coordination of existing programs has been another request.

#### **Training and Education**

Requests have been made for the appropriate departments of government to assist in education and training supportive of the industry. Similarly universities and other educational institutions have been asked to modify some of their activities to respond to the special needs of aquaculture.

## **4. AN AGENDA FOR CANADIAN AQUACULTURE DEVELOPMENT**

In November 1984, the federal government published a report entitled "A New Direction for Canada: An Agenda for Economic Renewal". In proposing a general strategy for economic renewal, the report stated that "promoting growth in the private sector is a fundamental requirement if we are to secure our objective of sustained growth and productive jobs". Stating further that governments had to be wary of becoming too big, intruding too much in the marketplace, inhibiting the entrepreneurial process, and over-regulating and over-protecting some industries — the report called for the cooperative action of federal and provincial governments to encourage the attainment of new opportunities in the private sector. In reviewing those opportunities, the report focused first on the area of R&D, innovation and technology diffusion, stating that:

"As much as two-thirds of recent economic growth has been attributed to technological change and there is every reason to believe that its influence will grow.

"If we are to be competitive, we must become effective in applying leading-edge technologies in producing goods and services. Economic success will stem not only from **producing** technology, but from **using** new technology in established industries, such as car-making, steel production, agriculture, mining and the forest industries."

In fish production, aquaculture is a major area where the application of R&D, innovation and technology diffusion is essential. This is being proven world-wide in a number of countries which are applying new technologies and techniques to gain an improved product from the fish resource. In recent years, the output from aquaculture has increased rapidly. Canada has lagged behind several countries in developing commercial aquaculture although, in a number of areas, we have been at the forefront in developing the related R&D, professional services, etc. In 1984, the Canadian aquaculture industry produced over 6,000 tonnes, valued at \$15 million but this output was equal to less than 1 percent of the country's value of fish products.

Over the last few years, a tentative consensus appears to have emerged among the interested parties as to some basic principles, objectives and the nature of the requisite programming for aquaculture.

- aquaculture should be designated as a priority for development by governments and the private sector;
- the private sector should have the lead role in commercial developments and the public sector should have a support role;
- additional government support is required in some areas, particularly research;
- tripartite (federal, provincial, private) committees would be useful at the regional level to advise governments on aquaculture policy and programs, to plan development strategies, to promote the industry's growth, and to inform industry on government activities; and
- the regulatory framework needs to be clarified.

Governments across the country have been responding to this new focus on aquaculture. Some provincial governments have introduced industry support programs, legislation to govern aquaculture, clarified the licensing arrangements, etc. Several federal-provincial initiatives have been launched or proposed in various regions of the country. For example, federal-

provincial fisheries agreements in the Maritime Provinces are now providing financial assistance for the expansion of the industry in that region. In Prince Edward Island, a tri-partite advisory committee has been established. In British Columbia, proposals have been developed for the establishment of a tri-partite committee, as well as a broad framework for federal-provincial cooperation. A number of other federal-provincial initiatives are being pursued elsewhere.

As the lead federal department for aquaculture development, the Department of Fisheries and Oceans (DFO) now makes the following proposals to build upon this foundation for the support of commercial aquaculture in Canada:

#### **National Policy Goals for Canadian Aquaculture**

The development of aquaculture in Canada can be promoted by establishing an understanding among governments, the industry and interested parties on a set of national policy goals for the domestic aquaculture industry. Such a set of goals might embrace and build upon the following:

- (i) to increase the high value, marketable species of fin fish and shell fish in the regions of Canada;
- (ii) to improve the quality and expand the variety of Canadian fish and fish products;
- (iii) to improve the reliability of supply of Canadian fish and fish products being marketed in Canada and abroad;
- (iv) to create new employment and enriched income opportunities in the production of fish;
- (v) to encourage long-range stability in the country's fish production sector through diversity and continuity of supply; and
- (vi) to promote development of appropriate technologies for intensive fish, shell fish and marine plant production.

In the pursuit of these goals, some basic principles should be:

- (i) to rely on the private sector to identify the opportunities, to establish the aquaculture ventures and to market the products;
- (ii) to clarify the overall regulatory frameworks of governments for commercial aquaculture;
- (iii) to sensitize and coordinate various government programs to provide support to the industry in some key stages of the industry development;
- (iv) to encourage continuing dialogue and exchanges between the industry and governments; and
- (v) to promote and conduct R&D to continue to improve the technological basis for commercial aquaculture.

#### **Aquaculture Advisory Committees**

As a priority, it is important to establish the appropriate structures to encourage the development of commercial aquaculture and, in doing so, to recognize the differentiated nature of this industry across the country. DFO therefore proposes that:

- DFO and the appropriate provincial agencies review the jurisdictional and regulatory frameworks for commercial aquaculture with a view to clarifying and rationalizing them; and
- Aquaculture Advisory Committees be established in each region.

DFO further proposes that the functions of these Committees should include:

- developing long term strategies or plans for commercial aquaculture in each region or province;

- advising government on research priorities in commercial aquaculture;
- recommending policy and program changes to address the problems facing the industry;
- promoting coordinated action by all levels of government;
- identifying sources of financial aid to the industry and advising government on the application of this aid to achieve commercial-scale development; and
- organizing workshops to establish priorities and requirements for commercial development.

#### **DFO Initiatives**

At the federal level, DFO could:

- maintain an Aquaculture Coordinator in each of DFO's regions;
- respond to the annual proposals of the regional Aquaculture Advisory Committees;
- tailor DFO programs to be supportive of commercial aquaculture;
- develop a database to support developments in aquaculture;
- issue a report on the range of federal assistance available to aquaculture;
- develop analysis on the markets for aquaculture products;
- undertake development-oriented research for aquaculture;
- review the federal regulatory framework for aquaculture;
- assist the Canadian aquaculture industry in gaining access to foreign technology; and
- encourage other federal departments to adjust some of their programs to respond to the needs of aquaculture.

#### **Provincial Initiatives**

The scope for additional provincial action in support of aquaculture could include initiatives to:

- identify aquaculture as a development priority;
- assist in the development of national policy goals for aquaculture;
- name Aquaculture Coordinators;
- participate in the establishment and operation of the proposed Aquaculture Advisory Committees; and
- tailor provincial programs to be more supportive of aquaculture.

#### **Cooperative Activities**

It can be assumed that as the Aquaculture Advisory Committees become operational, a number of proposals will emerge for cooperative activities by federal, provincial, industrial and/or university members (such as for the interim supply of seed, broodstock and foundation stock). Rather than call for a national program, most of the requests would be of a regional nature or site-specific.

#### **Concluding Comment**

In Canada, commercial aquaculture is an industry which appears to have considerable potential for growth, and for developing different species in different regions. The lead role in the industry development clearly and unequivocally must remain with the private sector. The role of governments should be to provide the appropriate investment climate, to clarify and simplify the regulatory framework and, where appropriate, to



help the industry overcome some of the obstacles to its growth. In providing this supportive role, there is a need for close federal-provincial cooperation. The essential purpose of this report is to encourage the two levels of government to focus attention on the industry, its potential and the obstacles to growth — and to consider some areas for further response, building upon many of the structures and arrangements which have been introduced, particularly in the last few years.

## ANNEX I

# FEDERAL ASSISTANCE

### A) THE DEPARTMENT OF FISHERIES AND OCEANS

DFO is the lead federal department in fostering the development of aquaculture in Canada, focussing particularly on research and experimental development, the protection of fish resources from communicable diseases, and the transfer and application of research results to industry. The department spent approximately \$3 million in 1984-85 in support of scientific research and commercial aquaculture development (excluding the Salmonid Enhancement Program and the Fish Health Protection Program). The Aquaculture and Resource Development Branch, Fisheries Research Directorate in Ottawa is the department's focal point for aquaculture. Aquaculture R & D is ongoing at several regional centres, in particular, the St. Andrews Biological Station; the Pacific Biological Station in Nanaimo; the West Vancouver Laboratory; and the Freshwater Institute in Winnipeg. R & D in nutrition, diseases, genetics and technology development, assessment and transfer is undertaken.

The Department has aquaculture scientific expertise present in laboratories located in St. John's, Halifax, Moncton, Rimouski and Burlington. Disease diagnostic services are provided by DFO laboratories to industry in many provinces, and scientists are available for consultation and to conduct collaborative research.

Aquaculture coordinators have been appointed in Gulf, Scotia-Fundy and Pacific regions to facilitate licensing approvals for aquaculture operations, access by the private sector to government programs, project proposal analysis, and information distribution. Persons involved in part-time coordination roles are present in Newfoundland, Quebec, Ontario and Western regions. Ottawa and regional offices provide technical information on request and assist investors in getting access to federal programs.

Private sector R & D benefit from science procurement contracts and the unsolicited proposals program (both through the Department of Supply and Services and in most cases managed by DFO); DFO science subvention grants are also available. DFO manages fishery-related projects under the Program for Industry/Laboratory Projects (PILP) which is funded by the National Research Council.

Aquaculture development has received limited support in some provinces through the Department's Fisheries Develop-

ment Fund to assist operators in utilizing the latest rearing and harvesting technologies and techniques for shellfish, salmonids and other species. Fisheries subsidiary agreements under the Economic Regional Development Agreements (ERDAs) have been signed with New Brunswick, Prince Edward Island and Nova Scotia and significant commitments have been made to aquaculture development by both DFO and the Provinces. Contributions to aquaculture development through these ERDAs will be \$1.2 million in both 1985-86 and 1986-87. By 1987-88, this figure will be over \$2 million. Activities will include improvements in overwintering techniques for salmonids, hatchery production to increase smolt production, mollusc habitat improvements and increased spawn availability, development of natural shellfish holding systems and cleansing units, and cost-sharing contributions to private sector projects.

### B) NATIONAL RESEARCH COUNCIL

The NRC has supported aquaculture R & D through two broad programs, the Industrial Research Assistance Program (IRAP) and the interdepartmental Program for Industry/Laboratory Projects (PILP). Both programs relate to research carried out in federal government laboratories and universities.

IRAP is a salary support program designed to increase the calibre and scope of industrial R & D through the use of the latest available technology. It is generally oriented towards small and medium-sized firms. In 1984-85, more than \$1.3 million was awarded to aquaculture-related projects.

PILP is designed to assist Canadian companies to undertake projects that take advantage of technology existing within government laboratories and Canadian universities. Fisheries and aquaculture projects under PILP are managed by DFO. In 1984-85, approximately \$650,000 was awarded to aquaculture-related projects through this program.

A number of NRC laboratories are also supportive of the aquaculture industry, particularly the Atlantic Regional Laboratory in Halifax which is a recognized leader of research in the area of marine plants.

### C) THE DEPARTMENT OF SUPPLY AND SERVICES

Contracts in the field of aquaculture research have also been issued as a result of unsolicited proposals with combined funding from both DFO and DSS's Unsolicited Proposals Program. This program is intended to be mutually beneficial to industry and government by encouraging the private sector to solicit government support for innovative research ideas. In 1984/85, over \$450,000 was awarded to aquaculture-related projects for disbursement over several years.

### D) NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA

NSERC promotes and assists research and research training in the natural sciences and engineering other than the health sciences. Its programs are directed towards the university sec-

tor, but include major initiatives to foster dialogue and technology transfer between universities and industry.

In 1984-85, approximately \$1,100,000 was expended on research in aquaculture, primarily as operating and strategic grants. Additional expenditures in equipment and infrastructure grants also support aquaculture. Associated with this research activity are graduate students and postdoctoral fellows, many of whom are supported through direct scholarships or fellowships from NSERC or from the grants themselves. The recently expanded University-Industry program provides support for cooperative R&D projects, the purchase of major equipment and the establishment of research chairs in universities, providing that there is an industrial partner for the university activity.

Operating, regular equipment and infrastructure grants provide support for the long-term research programs of most university researchers, with Strategic and University-Industry programs providing mechanisms to further develop and exploit the research results generated through the operating grants program (normally more focussed, short-term projects). Of particular interest to the aquaculture industry are strategic grants in oceans and in food and agriculture, in which NSERC has highlighted aquaculture as a major area of interest for Canada. NSERC's program of workshop support can also be used to foster dialogue between university, industry and government sectors.

## **E) DEPARTMENT OF REGIONAL INDUSTRIAL EXPANSION (DRIE)**

While the Industrial and Regional Development Program (IRDP) of DRIE does not provide assistance to primary activities (including fish farming), it has provided assistance to some aquaculture-related activities such as processing, the formulation of feeds and the development of related equipment. Between August, 1982 and June, 1985, approximately \$1.1 million was approved under IRDP for aquaculture-related activities.

The aquaculture industry can also benefit from some of the Economic and Regional Development Agreements (ERDAs) which DRIE has entered into with the provinces. For example, it was recently announced that a \$50 million, five-year ERDA subsidiary agreement in British Columbia, yet to be signed by the two parties, would provide assistance to firms engaged in manufacturing, processing and aquaculture. DRIE and the B.C. government are cooperating in the establishment of a new Aquaculture Research and Development Centre in Nanaimo, to be completed in 1985. Funding for this project comes from a \$2.5 million loan from the Industrial Development Subsidiary Agreement. In Saskatchewan, a major study to explore opportunities for commercial aquaculture has been funded under the ERDA planning subsidiary agreement.

Some commercial aquaculture activities can be eligible for business improvement loans under the Small Business Loans Act (SBLA) if the principal business carried out falls under those classes of business set forth in the Act such as manufacturing, wholesale trade, retail trade or service business, etc.

## **F) FEDERAL BUSINESS DEVELOPMENT BANK (FBDB)**

The FBDB is a Crown Corporation that offers services primarily to small and medium-sized businesses. The three main

services include financial services (loans, loan guarantees and financial planning), investment banking (equity financing) and management services (counselling, training and information). FBDB's services complement those of private sector financial institutions by providing funds that are not available elsewhere on reasonable terms for the development of commercially viable projects.

FBDB's present involvement in aquaculture is limited to term loans to five aquaculture companies, all of which are in B.C. Approximately \$300,000 is currently outstanding on these loans.

## **G) SCIENCE COUNCIL OF CANADA (SCC)**

The SCC has been involved in some high profile, aquaculture projects in recent years although these are not of a continuing nature. The Council co-sponsored (with DFO) the 1983 National Aquaculture Conference. In 1984, it sponsored an industry task force report entitled "Aquaculture: A Development Plan for Canada" and, in 1985, it produced a Science Council Statement entitled "Aquaculture: An Opportunity for Canadians". The Science Council's short-term involvement in aquaculture was part of its overall interest in exploring new issues and opportunities related to the broader spectrum of science and technology.

## **H) DEPARTMENT OF ENERGY, MINES AND RESOURCES (EMR)**

Some aquaculture research is supported by EMR, primarily under the energy program. For example, EMR is providing funds for approximately 39 percent of the cost of aquaculture projects directed by the Canadian Electrical Association (CEA). CEA has been involved in a number of waste-heat aquaculture projects.

EMR administers the Industry Energy Research and Development Program (IERD) which was formerly associated with DRIE. Commercial aquaculture development has received some support through this program.

## **I) DEPARTMENT OF THE ENVIRONMENT (DOE)**

DOE establishes effluent standards for industrial sites. The department also assesses the environmental impact of new aquaculture ventures. In addition, it monitors shellfish growing areas for environmental problems which would affect the edibility of the shellfish.

## **J) DEPARTMENT OF AGRICULTURE**

Agriculture Canada administers the Animal Diseases Protection Act under which the import and registration of biologics and fish vaccines are regulated. Also, the department labels fish feeds under the Canada Feeds Act.



## K) OTHER

Aquaculture ventures have also received benefits from the programs of the Canadian Employment and Immigration Commission (manpower training, job creation measures), the Department of Indian and Northern Affairs (Native aquaculture projects), the Canadian International Development Agency and the International Development Research Centre (international aid), and the Department of External Affairs (under the Program for Export Market Development).

## ANNEX II

# THE LEGISLATIVE FRAMEWORK

Similar to many other industries, Canadian aquaculture is governed by a number of jurisdictions and by several pieces of legislation. This is not surprising, given the diversified range of activities of aquaculture which are the subject of some legislative control (e.g. the use of waters and land; fish health; species introduction; transportation and marketing).

The following listing, which was prepared by Dr. Wildsmith of Dalhousie University, sets out the respective federal and provincial roles for aquaculture on a topical basis.

TOPIC	GOVERNMENT	BASIS OF JURISDICTION
<b>1. Physical location</b>		
A. Linkage to provincial and municipal planning	Provincial	Property and civil rights (s. 92(13))
B. Linkage to shipping and navigation	Federal	Shipping and Navigation (s. 91(10))
C. Rights to surface land	Provincial (assuming not federal lands)	Property and civil rights
D. Rights to sub-aquatic land and water space within provincial boundaries (leasing)	Provincial (assuming not federal lands)	Property and civil rights
E. As D but outside provincial boundaries	Federal	Peace, Order and Good Government (s.91) and Supreme Court of Canada (SCC) decisions and federal public property (s. 91(1A))

F. Use of water within provincial boundaries	Provincial (putting aside question of interprovincial and international waterways)	Property and civil rights
G. As F but outside provincial boundaries	Federal	Peace, Order and Good Government (s.91) and S.C.C. decisions and federal public property
H. Construction of facilities	Provincial	Property and civil rights

## 2. Organisms

A. Introduction of species	Federal and Provincial	Fisheries (s. 92(12)) and Property respectively
B. Supply of - commercial	Provincial	Property and civil rights
- wild	Federal	Fisheries
C. Property rights in organisms within provincial boundaries	Provincial	Property and civil rights
D. Property rights in organisms outside provincial boundaries	Federal	Peace, Order and Good Government
E. Fishing For	Federal	Fisheries
F. Transport - within province	Provincial and Federal	Property and civil rights and fisheries respectively
- out of a province	Federal	Trade and commerce (s.91(2)) and Fisheries
G. Sale - within a province	Provincial	Property and civil rights
- out of a province	Federal	Trade and commerce
H. Inspection - Fish Health	Both or Federal	
I. Escape	Both or Federal	
J. Predator Control - marine & migratory birds	Federal	Fisheries and Empire Treaty (s. 132)
- land & air	Provincial	Property
K. Feed	Provincial	Property
L. Theft	Federal	Criminal Law

3. <b>Ranching, especially in travelling outside province</b>	Federal	Fisheries, Peace, Order and Good Government, and federal public property
4. <b>Marketing &amp; Processing</b>		
– for sale within province	Provincial	Property and civil rights
– for sale outside province	Federal	Trade and commerce
5. <b>General licensing</b>	Provincial	Various
6. <b>Insurance</b>	Both	Spending powers
7. <b>Pollution</b>		
– protection from	Provincial	Property and civil rights
– as a source of	Both	Property and fisheries
8. <b>Loans, Taxation, Pilot projects, R&amp;D, and other stimulative measures</b>	Both	Various, but basically powers of taxation and unlimited spending ability (in constitutional sense)
9. <b>Statistics</b>	Both	

Given the above, many observers have suggested that the jurisdictional framework for aquaculture in Canada is very much a tangled web. As a result, close cooperation between the two senior levels of government is essential to ensure the growth and prosperity of the aquaculture industry across the country.



**Published by:**

Communications Directorate  
Fisheries and Oceans  
Ottawa, Ontario  
K1A 0E6

**DFO/2808/1**

Minister of Supply & Services Canada 1986  
Cat. No. Fs 23-86/1986E  
ISBN 0-662-14589-5

